

# INDIANA



# LIMESTONE

Montana Veterans and Pioneers Memorial, Helena, Mont.—*Arch't.* A. V. McIver, Great Falls, Mont.



V. A. Research Hospital, Chicago, Ill.—*Arch't.* Veterans Bureau, Washington, D.C.



**THE NATURAL BUILDING STONE THAT ENHANCES MODERN OR TRADITIONAL ARCHITECTURE**

**INDIANA LIMESTONE INSTITUTE**

bedford, indiana





# the story of INDIANA LIMESTONE

The story of Indiana Limestone began thousands of years ago when billions of minute marine animals died and their bodies were compressed by earth movements into what is known as "Oolitic" Limestone. It has become famous throughout the United States for its beauty, durability and distinctive appearance.

Found almost wholly within three Indiana counties: Lawrence, Monroe and Owen, Indiana Limestone has been used in the construction of many famous buildings—The Triangle Group in Washington, D.C., Pentagon Building, Empire State Building, Chicago Tribune Tower, Radio City and Washington Cathedral are but a few of the architectural masterpieces. Practically every town in the United States contains at least one building made of Indiana Limestone.

## PHYSICAL CHARACTERISTICS

### 1. Composition and Structure

Indiana Limestone is the type of rock termed by geologists as Oolitic Limestone. It is a calcite cemented calcareous stone formed of shells and shell fragments, practically non-crystalline in character. It is characteristically a free-stone without cleavage plane, possessing a remarkable uniformity of composition, texture and structure and equality of strength in all directions regardless of the plane of its natural bed. It possesses a high internal elasticity, adapting itself without damage to extreme temperature changes and other prerequisites of permanence demanded in modern building structures.

2. The average analysis as developed by carefully prepared composite samples is given below.

	Buff	Gray
Carbonate of Lime	97.39	97.07
Carbonate of Magnesia	1.20	1.20
Silica	.69	.80
Alumina	.44	.68
Iron Oxide	.18	.12
Water and Loss	.10	.13
WEIGHT	100.00	100.00

3. The average weight of dry (seasoned) Indiana Limestone is 144 lbs. per cubic foot.

### 4. Strength-Recommended Values

This data is taken from information developed by tests made at the Bureau of Standards in Washington.

a. **Crushing strength.** The crushing value for seasoned stone varies from about 4,000 to 7,000 lbs. per sq. inch, averaging close to 4,000 lbs. per sq. in. Taking this value at 4,000 lbs. per sq. in. for any of the grades is conservative and sufficiently close for all practical purposes.

b. **Tensile strength.** The tensile strength for seasoned stone varies from 300 to 715 lbs. per sq. in., averaging 535 lbs. per sq. in. Although

stone seldom, if ever, is used in tension, using a factor of safety of ten (10) with the above average results gives a conservative working value of 50 lbs. per sq. in.

c. **Transverse strength.** The modulus of rupture varies from about 900 to 1,600 lbs. per sq. in., averaging approximately 1,250 lbs. On this assumption, with a safety factor of ten (10) a working stress of 125 lbs. per sq. in. is applicable to the design of lintels and similar "stone beams."

d. **Shear.** The shear tests were confined to representative samples of grades, based upon the crushing and other tests, that were sufficient to show a full range of the product. These tests were made on the stone in three directions and the average taken for the figures below. The shear developed ran from 900 to 2,300 lbs. per sq. in. for all grades tested, averaging 1,600 lbs. per sq. in.

e. **Elasticity.** The coefficient of elasticity has been established at 4,400,000 lbs. per sq. in.

f. **Expansion.** The coefficient of expansion has been established as .0000027 in. per degree Fahrenheit.

### 5. Fire Resistance

Indiana Limestone is to all intents and purposes fireproof. It calcines above 1,500° F. and it will not spall, crumble, split nor check when drenched with cold water.

### 6. Color

Indiana Limestone is marketed in two color-tones, each of varying shades called "Buff" and "Gray" and in an irregular mixture of the two called "Variegated."

**GRAY**—The Gray is a silvery gray stone with a slightly bluish cast.

**BUFF**—The Buff varies from a very light creamy buff or buff-gray to a distinct brownish-buff.

**VARIEGATED**—Consists of both buff and gray stone with some pieces containing both color-tones.



## GRADES OF INDIANA LIMESTONE

The conventional grades of Indiana Limestone, Select, Standard and Rustic are classified by their fineness of grain. The cuts on this page show the limits of fineness separating Statuary, Select, Standard and Rustic. Statuary includes only the finest grain stone (A); all stone between the fineness A and B is graded Select; between B and C as Standard and between C and D as Rustic.

Variegated (E) is a mixture of buff and gray, ranging from Standard up through Select.

Old Gothic is a mixture of Rustic and Variegated and also includes some few stone having "Crowfeet" (F) and other marking not affecting the strength of the stone.

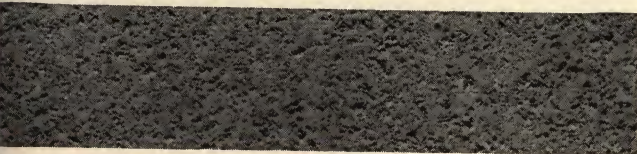
For complete description of these and other "Special" varieties of Indiana Limestone, write for our Specification Manual and/or samples of Indiana Limestone.



A



B



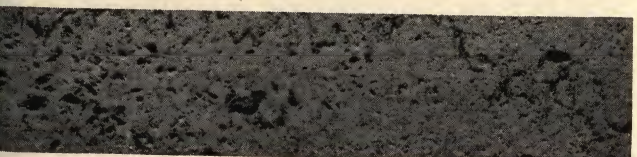
C



D



E



F

## SURFACE FINISHES

Indiana Limestone in addition to the large range of grades of stone is adapted to a wide variety of standard machine and hand tooled finishes. New and special finishes are constantly being developed.

Following is a short description of the finishes most commonly used and their adaptability.

### 1. Sand-Sawed Finish

**Description** — The surface left as the stone comes from the gang saw. Moderately smooth, granular surface varying with the texture and grade of stone.

**Adaptability** — Adapted to the various types of ashlar or field work.

### 2. Rough Shot-Sawn or Chat-Sawn Finish

**Description** — A rough gang saw finish produced by sawing with coarse chat or chilled steel shot.

**Adaptability** — Particularly adapted to various types of ashlar of the coarser grades of stone.

### 3. Smooth Machine Finish

**Description** — The generally recognized Standard Machine Finish produced by the planers.

**Adaptability** — An economical finish where a smooth finish is desirable and appropriate.

### 4. Wet Rubbed Finish

**Description** — Sand and water or Carborundum and water rubbed for smoother finish.

**Adaptability** — For all parts whenever a smooth dirt and grime resisting finish is desired.

### 5. Honed Finish

**Description** — A superfine smooth finish.

**Adaptability** — Usually confined to fine interior work.

### 6. Machine Tooled Finishes

**Description** — Customarily are four, six or eight parallel, concave grooves to the inch.

**Adaptability** — Used principally on ashlar surfaces with mold work finished smooth.

### 7. Carborundum Finish

**Description** — Very smooth. Produced by a Carborundum machine instead of planer.

**Adaptability** — May be specified for flat surfaces and for moldings.

### 8. Plucked Finish

**Description** — Obtained by rough planing the surface of stone, breaking or plucking out small particles to give rough texture.

**Adaptability** — Often used as finish on cut stone trim with facing of Shot-Sawn.

### 9. Other Finishes

Many other machine and hand-tooled finishes are available. Complete information on these and much additional information on those listed is available by writing Indiana Limestone Institute.



## how to use Indiana Limestone economically

**All Indiana Oolitic Limestone regardless of Grade is equally strong for all practical purposes.**

There is a grade, color and finish economically adapted to every class of work from the finest monumental structure to the simplest stone front. Proper selection of the grade is of paramount importance and in the exercise of good judgment in this respect lies great economy, with no lessening of beauty and permanence.

### rustic

A less expensive grade, owing to its varying texture and pleasing color variation, can be used to good advantage for many features, for complete facing, or for facing above "Standard" Stone. The use of "Rustic" for isolated sills, factory sills and coping is definitely practical. It is especially recommended where Shot-Sawn or rough finish is desired. Always consider "Rustic" for a structure before specifying another grade.

### variegated

Another less expensive grade, is sound and durable with distinct color tone and moderate range of texture variation. The possibility of its use is always recommended in combination where "Standard Buff" or "Standard Gray" Stone is used for entrances or features.

### standard gray or standard buff

Has certain variations in density, color tone and texture. However, these variations are much less pronounced than in "Rustic" and "Variegated" Stone. Its use is recommended where general uniformity is desired as in entrances, other ornamental features and wall facing for first and second stories of buildings. Its use is not recommended for Shot-Sawn or other rough finishes as "Rustic Buff" or "Rustic Gray" will give equal result.

### select buff or select gray

Embraces the finest grained stone and it is recommended that it be used in special cases for entrance façades, carved and sculptured stone, or where cost is not a prime factor. Remember all Indiana Oolitic Limestone, regardless of grade or color is structurally sound and averages the same compressive and transverse strength. Careful selection will warrant the use of less expensive grades of stone in most cases, thus obtaining an equal result at the least cost.



General Accounting Building, Washington, D. C.  
Architects—Public Building Administration



Dr. Pepper Company, Syrup Bottling Plant and Office, Dallas, Texas  
Architects—Thomas, Jameson and Merrill, Dallas, Texas



St. Columba's Church, St. Paul, Minnesota  
Architect—Barry Byrne, Chicago, Illinois





## specifications for cut Indiana Limestone

### 1. work included

The work under this contract shall include all labor and material for the furnishing of cut Indiana Oolitic Limestone in accordance with the drawings and as hereinafter specified.

### 2. description of stone

All Limestone specified or shown on drawings shall be Indiana Oolitic Limestone building stock, as quarried in Lawrence and Monroe Counties, free from all defects that would materially impair its strength, durability or appearance, and within the range of variation of color and texture represented by two samples approved by the Architect.

Stone shall be \_\_\_\_\_  
(Specify Grade & Color)

grade, \_\_\_\_\_ finish.  
(Specify Finish)

Specially graded stone, acceptable as to hardness and color, as per samples to be submitted, shall be employed where indicated on drawings,

for \_\_\_\_\_  
(Specify Locations)

and all other positions exposed to direct wear.

### 3. samples

The Contractor shall submit to the Architect, two samples about 4" wide x 7" long x 1" thick, which shall be typical of the extremes which the Contractor proposes to furnish, the finish specified to be indicated on the large faces.

### 4. standard practice

Insofar as these specifications pertain to the practice set out for the proper use of Indiana Oolitic Limestone, the standards established by the Indiana Limestone Industry are to govern. Bidders not familiar with these standards are cautioned to inform themselves regarding them.

The Architect reserves the right to approve the sub-contractor for Cut Stone before this portion of the work is awarded.

### 5. cutting and setting drawings

The Cut Stone Contractor shall prepare and submit to the Architect for approval, complete cutting and setting drawings, in triplicate, for all of the Limestone work under the contract. Such drawings shall show in detail the sizes, sections and dimensions of stone, the arrangement of joints and bonding, anchoring and other necessary details.

These drawings shall be based upon and follow the drawings and full-size details prepared by the Architect except where it is agreed in writing that changes be made. Each stone indicated on these drawings shall bear the corresponding number marked on the back or bed with a non-staining paint.

Projecting courses shall have beds in the wall at least 1" greater in depth than the projection, or be specially anchored to the structure as shown on setting drawings.

Provision for the proper anchoring, dowelling and cramping of work in keeping with standard practices, also for the support of stone by shelf angles and loose steel, etc., when required, shall be clearly indicated on the setting drawings.

### 6. carving and models

All carving shall be done under this contract by skilled carvers in a correct and artistic manner, in strict accordance with the spirit and intent of the Architect's sketches, or from models prepared or approved by the Architect.

### 7. cutting

All stone shall be cut accurately to shape and dimensions and full to the square, with jointing as shown on approved drawings. All exposed faces shall be cut true and out of wind. Beds and all joints shall be dressed straight and at right angles to the face, unless otherwise shown, and except where otherwise shown or noted on drawings, joints shall have a uniform thickness of  $\frac{1}{4}$  inch.

Patching or hiding of defects will not be permitted and Lewis holes shall not be made on an exposed surface.

Washes shall be as deep as practicable and drips of sufficient width and depth to shed water shall be provided on all projecting stones and courses.

Raglets for flashing, etc., shall be cut in the stone where so indicated on the drawings.

Molded work shall be carefully executed from full-size details supplied by Architect, and must match perfectly at joints. All arrises shall be sharp and true.

### 8. back checking and fitting to structural frame

Stone coming in contact with structural work shall be back-checked as indicated on the general drawings. Stones resting on structural work shall have beds shaped to fit the supports.

Where stone facing adjoins steel columns and spandrel girders, the depth of stone shall be such that will allow not less than one inch between the back of the stone and face of fireproofing or reinforced structural members.

### 9. Lewis holes and cutting for dowels, anchors, cramps, etc.

Lewis holes shall be cut in all stones weighing more than 100 pounds. No Lewis or other holes shall come closer than 2 inches to the exposed face of the stone.

Holes and sinkages shall be cut in stones for all anchors, cramps, dowels, etc., called for under this specification or indicated on the cutting and setting drawings.

### 10. cutting and drilling for other trades

All cutting and drilling of stone necessary in connection with installation of work of other trades to be done by cut stone contractor only when necessary information is furnished in time to be shown on shop drawings and details and work can be executed before shipment.

### 11. loading and shipment

The Cut Indiana Limestone shall be carefully packed for transportation, with exercise of all customary practicable and reasonable precautions against damage in transit.

All cut stone under this contract shall be delivered promptly as ordered and in the sequence in which it is to be set.



## short form specifications

### for setting, cleaning and waterproofing of cut Indiana Limestone

#### 1. delivery and storage

All stone shall be unloaded and delivered to the site, with all necessary care in handling being maintained to avoid soiling or damaging.

When stored, stone shall be clear of the ground and adequately protected from all elements.

#### 2. setting mortar

a. General. All stone shall be set in nonstaining mortar as specified below.

b. Nonstaining Cement-lime Mortar. This mortar shall be composed of one (1) part nonstaining cement, one (1) part hydrated lime, and six (6) parts sand.

Note: If lump lime paste is used in place of hydrated lime, first thoroughly mix the paste and sand and stack to age; the cement shall be added and thoroughly worked into the lime and sand mixture in small batches just prior to use.

c. Retempering. Mortar shall never be retempered. Mixtures shall be used before initial set has taken place.

#### 3. pointing mortar and grout

a. General. All pointing shall be done with nonstaining mortar as specified in the following:

b. Pointing Mortar. Pointing Mortar shall be composed of one (1) part nonstaining cement, two (2) parts white sand, and sufficient lime or lime putty to make as stiff a mixture as can be worked. The mixture should be prepared one to two hours before using and should not be retempered with addition to water.

c. Grout. Grout shall be composed of one (1) nonstaining cement and one and one-half ( $1\frac{1}{2}$ ) parts of fine white sand, mixed in small quantities of as thick a consistency as can be poured into the joints. Grout shall be stirred vigorously until used.

#### 4. anchors, dowels, etc.

The setting contractor shall furnish and set all anchors, cramps, dowels, etc., shown on the approved shop drawings.

All steel anchors, cramps, etc., shall be thoroughly galvanized after they have been bent.

#### 5. concrete surfaces

All concrete surfaces, shelf angles, etc., against which limestone is to be applied, shall be coated with an impervious waterproof coating applied by others. The setting contractor shall inspect this before proceeding and report any defects prior to the setting of any stone.

#### 6. setting

All Indiana Limestone shall be set accurately in strict accordance with the contract and shop drawings.

When necessary, before setting in the wall, all stones shall be thoroughly cleaned on all exposed surfaces by washing with brush and soap powder, followed by a thorough drenching with clear water.

Just prior to setting all stones not thoroughly wet shall be sponged or drenched with clean water.

All cut stone work shall be set level, plumb, square, and true with uniform joints.

Except as otherwise specially noted, every stone shall be set in full beds of mortar with all vertical joints flushed full. Completely fill all anchor, dowel, and similar holes. All bed and vertical joints shall be  $\frac{1}{4}$  in. unless otherwise noted.

Use lead buttons under heavy blocks, column drums, etc.

Do not set heavy stones or projecting courses until mortar in courses below has hardened.

Projecting stones shall be securely propped or anchored until the wall above is set.

Only the ends of lugged sills and steps shall be embedded in mortar. Balance of joint shall be left open until finally pointed.

All cornices, copings, projecting belt courses, steps, platforms, etc. should be set with unfilled vertical joints. The exterior profile of these joints shall be caulked with (Ropeyarn) (Picked Oakum) and after wetting the ends of the stone thoroughly fill the joint full from above with mortar grout to within  $\frac{3}{4}$  in. of top. After the grout has set remove caulking for pointing.

Unless otherwise noted, rake out all joints  $\frac{3}{4}$  in. from the face for pointing. Sponge the face of stone clean along all joints. Avoid splashing mortar on exposed faces of stone. Droppings shall be removed immediately by means of sponge and clear water.

Setting shall not proceed more than two courses in advance of backing.

#### 7. parging

The backs of all stones and exposed sides of bond stones shall be parged with a coat of waterproofed setting mortar not less than  $\frac{1}{2}$  in. thick before the masonry backing is built. Let parging mortar be sufficiently dried before laying the backing.

Note: If nonstaining cement is used in backing and facing masonry, parging may be omitted.

Where solid stone piers or columns are checked out to fit around structural columns a clear space of 1 in. shall be maintained between the structural members and the back of the stone.

#### 8. pointing

All face joints shall be thoroughly brushed or raked out to a depth of  $\frac{3}{4}$  in. Thoroughly wet the joint and point flush with pointing mortar forced into the joint and rubbed smooth to the section detailed. Especial care shall be exercised in caulking and pointing up all top or wash joints flush with caulking compound.

Thoroughly point up open joints under lugged sills to a minimum depth of 1".

Where metal flashings are set in reglets, point up flush, with an approved elastic caulking compound.

#### 9. protection of finished work

The receipt, storage, and protection of cut stone work prior to, during, and subsequent to installation shall be the responsibility of the general contractor and the cost of such protection shall be borne by him.

During construction, tops of walls shall be carefully covered at night and in bad weather.

At all times walls shall be adequately protected from drippings and heavy rains.

Wherever necessary or whenever directed by the proper authority, substantial nonstaining wooden covering shall be placed to protect particular portions of the stone work. If necessary, nonstaining dry felt or building paper shall be used under the wood. Maintain all until removed to permit final cleaning of the stone work.

Sills and horizontal courses or other projecting work shall be projected in a manner acceptable to the proper authority.

#### 10. cleaning

Sand blast, wire brushes or acids will not be permitted under any circumstances for the cleaning of stone work. Soap powder, clean water and fibre brushes may be used or approved machine cleaning process.



## Limestone Veneer

Indiana Limestone Veneer is fabricated in random lengths ranging from one to six feet. Unselected for color or texture the stone combines varying shades of buff and gray.

Veneer is produced in three finishes: Splitface, Shot-Sawn and Sand-Sawn. It is marketed in three standard heights which conform with brick courses. They are  $2\frac{1}{4}$ " , 5" and  $7\frac{3}{4}$ ". Other heights are available on order.

Splitface is a rough, concave-convex finish and is approximately  $3\frac{1}{2}$ " thick. One ton will provide about forty-five square feet of wall coverage.

Shot-Sawn and Sand-Sawn are available in either 3" or 4" thickness. One ton of 3" will cover approximately fifty square feet of wall surface; the 4" about forty square feet.

The Shot-Sawn surface presents a series of horizontal grooves, or ripples, scored on the face of the stone by using chilled steel shot in the sawing process. Some pieces will be more or less uniformly roughened like a rough textured tapestry brick; the surfaces of other pieces will be irregularly corrugated, or rippled to a degree impossible to obtain in other materials.

Sand-Sawn is a smooth-surface Limestone Veneer. This surface is imposed on the face of the stone by using gritty sand as the cutting agent.

Either Shot-Sawn or Sand-Sawn finish has a further advantage of widening the range of color tone. The method of sawing permits a certain amount of rust stain to develop on the surface, adding the brown tones thus obtaining to the natural color variation of the stone.

**Complete information** and brochures describing the use and application of Limestone Veneer for use on residences, churches, schools, motels and commercial buildings, etc., are available without cost by writing Dept. SC-2, Indiana Limestone Institute, Bedford, Indiana.



Annunziata Parish, Ladue, Missouri  
Architects—Maguolo and Quick, St. Louis, Missouri

### SPLITFACE FINISH

Preserves the attractive - natural appearance. Creates maximum play of light and shadow.



G

### SHOT-SAWN FINISH

Emphasizes long horizontal architectural lines. Popular for ranch style designs.



H

### SAND-SAWN FINISH

Smoothest, most uniform finish available. Tends to appear lightest of all finishes.



I



Residence using Splitface Limestone Veneer



# Indiana Limestone Institute

The purpose of the Indiana Limestone Institute is to coordinate the various interests in the Indiana Limestone Industry; to promote the product of its members impartially and advertise truthfully; to conduct product and application research; to compile and distribute literature and technical information; to establish and maintain standard varieties of finishes and fabrication and to provide complete master samples as required.

It embraces, also, service to architects and builders through helpful suggestions as to selection of material and finish in order to attain the greatest possible degree of satisfaction with minimized expense.

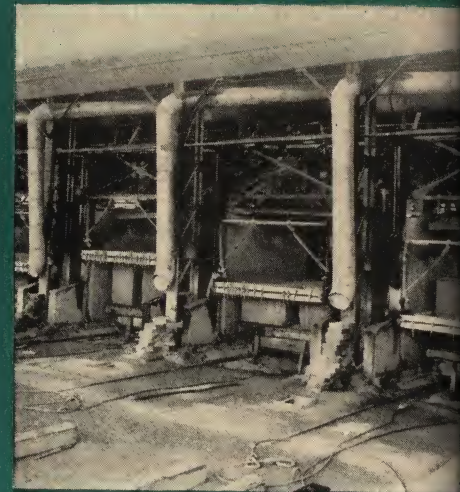
## ROSTER OF MEMBERS

### name of company

Bedford Stone Service  
Bloomington Limestone Corp.  
Edward Edinger Co. Inc.  
Empire Stone Company  
Fagan Stone Co.  
Fluck Cut Stone Co.  
Forburger Harris S. Co.  
The Carl Furst Co.  
Harding & Cogswell  
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Indian Hill Stone Co.  
Indiana Limestone Co., Inc.  
Ingalls Stone Co.  
Jones & Reath Cut Stone Co.  
Matthews Bros. Co.  
Midland Cut Stone Co.  
Midwest Stone Co.  
McNeely Stone Co.  
Summitt-Cogswell Corp.  
Texas Quarries, Inc.  
Woolery Stone Co.

### address

Bedford, Indiana  
Bloomington, Indiana  
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Bloomington, Indiana  
Bedford, Indiana  
Ellettsville, Indiana  
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Bloomington, Indiana  
Bloomington, Indiana  
Bloomington, Indiana  
Ellettsville, Indiana  
Ellettsville, Indiana  
Bloomington, Indiana  
Bloomington, Indiana



Huge blocks of Limestone are cut into slabs prescribed thicknesses by these gang saws.



Diamonds stud the cutting edge of this whirling circular saw cutting out slabs of stone.



A skilled planer turns out detailed finishing on this circular planer at one of the mills.



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